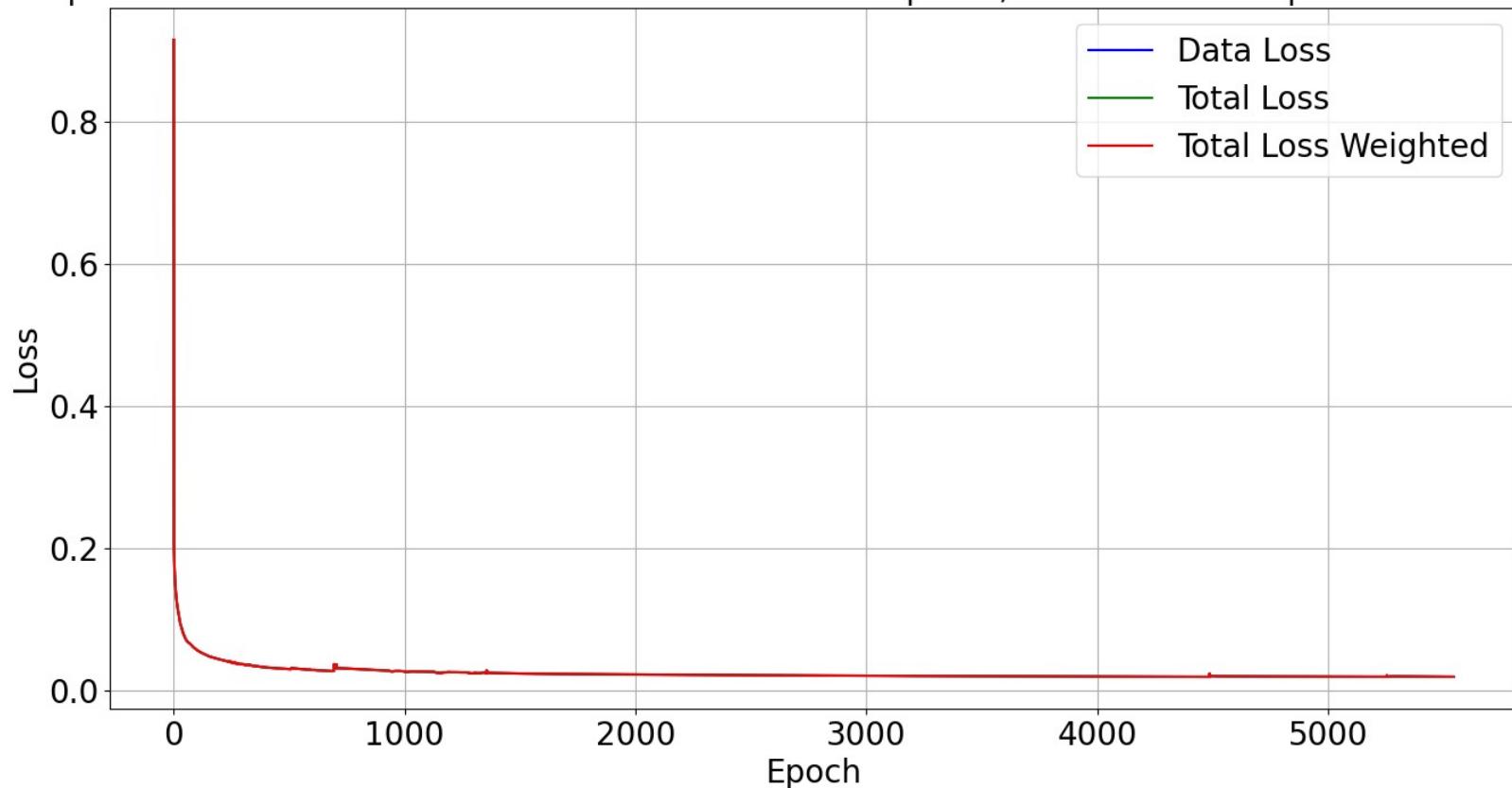


# PM0XX – 12 MARCH 2024

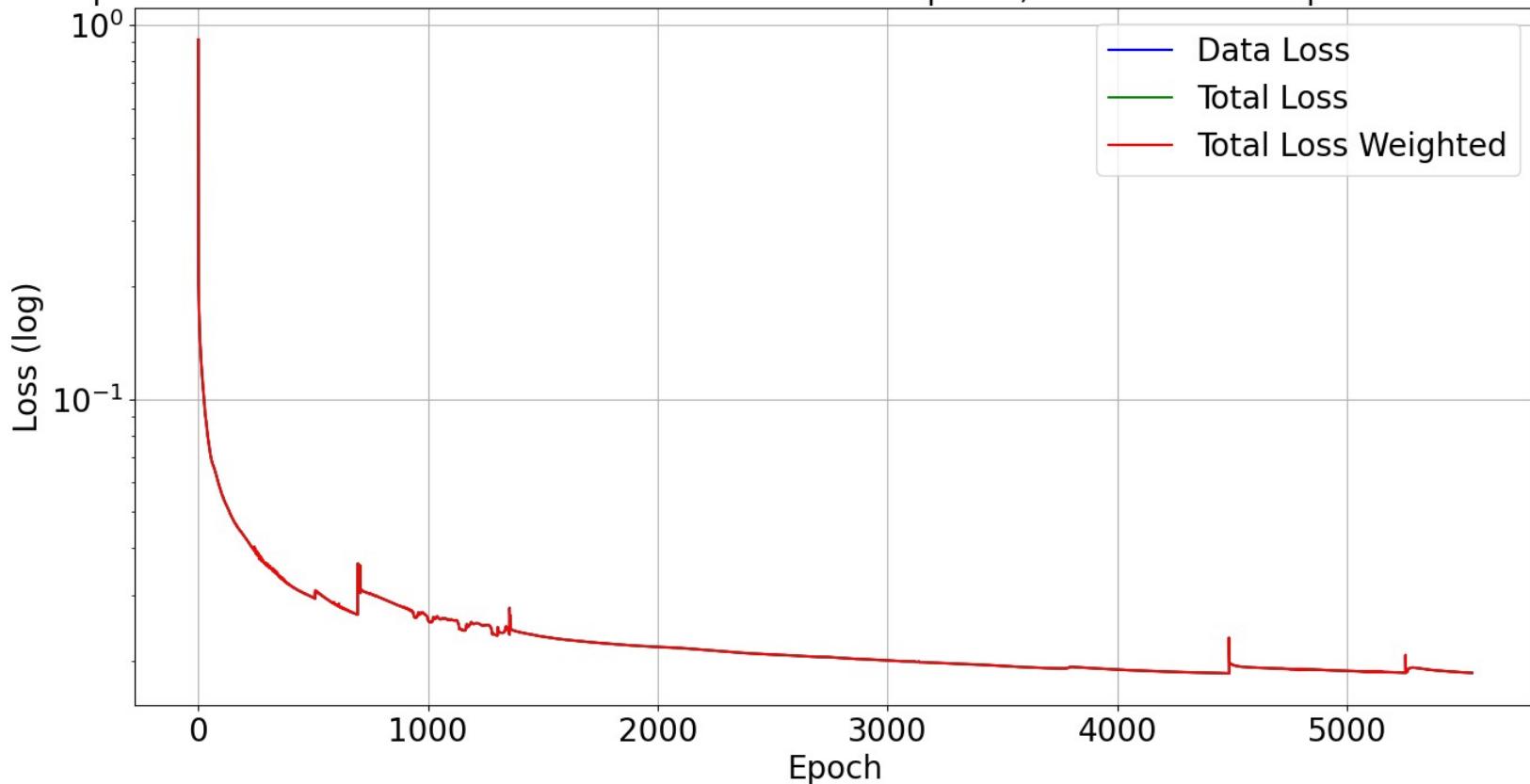
## La Defense – Training with Sampled Data

### Application to Urban Wind Field Dispersion Studies

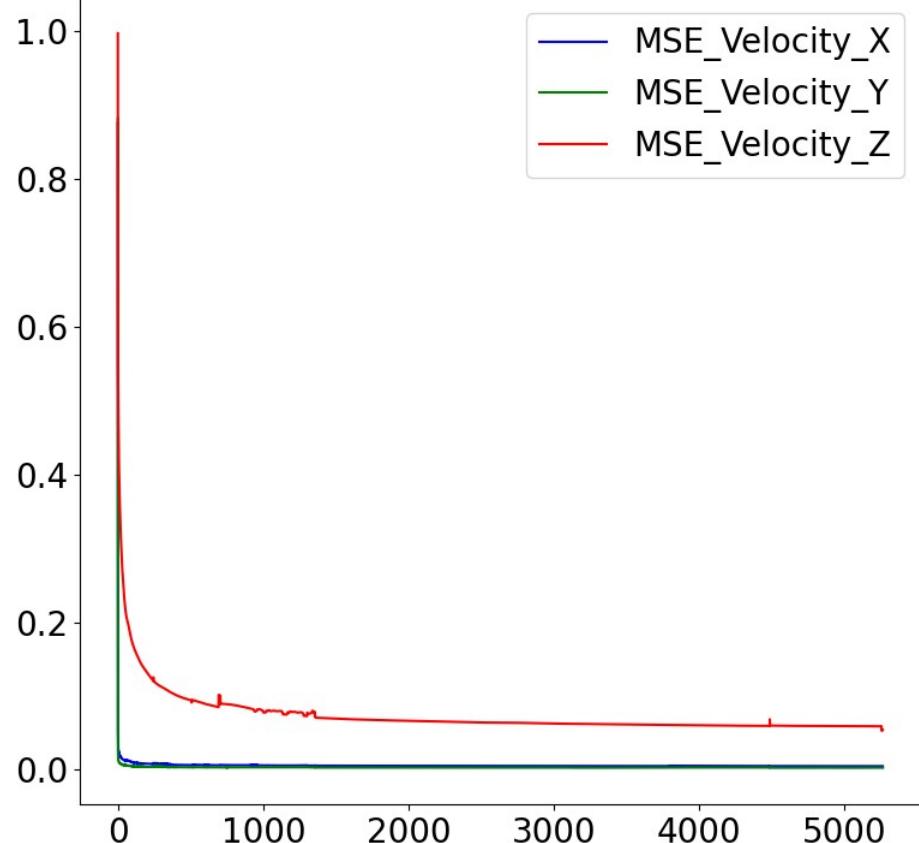
Epoch vs Loss - Time Taken = 420.25 hours for 5542 Epochs; Time Taken Per Epoch = 0.08 hours



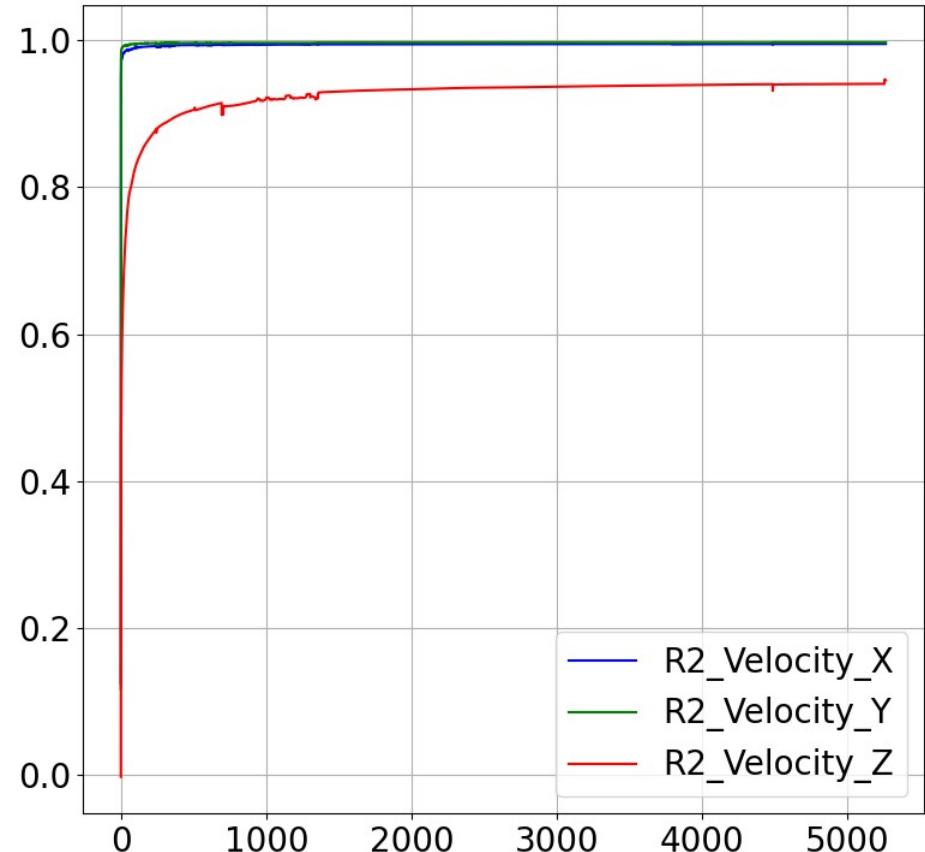
Epoch vs Loss - Time Taken = 420.25 hours for 5542 Epochs; Time Taken Per Epoch = 0.08 hours



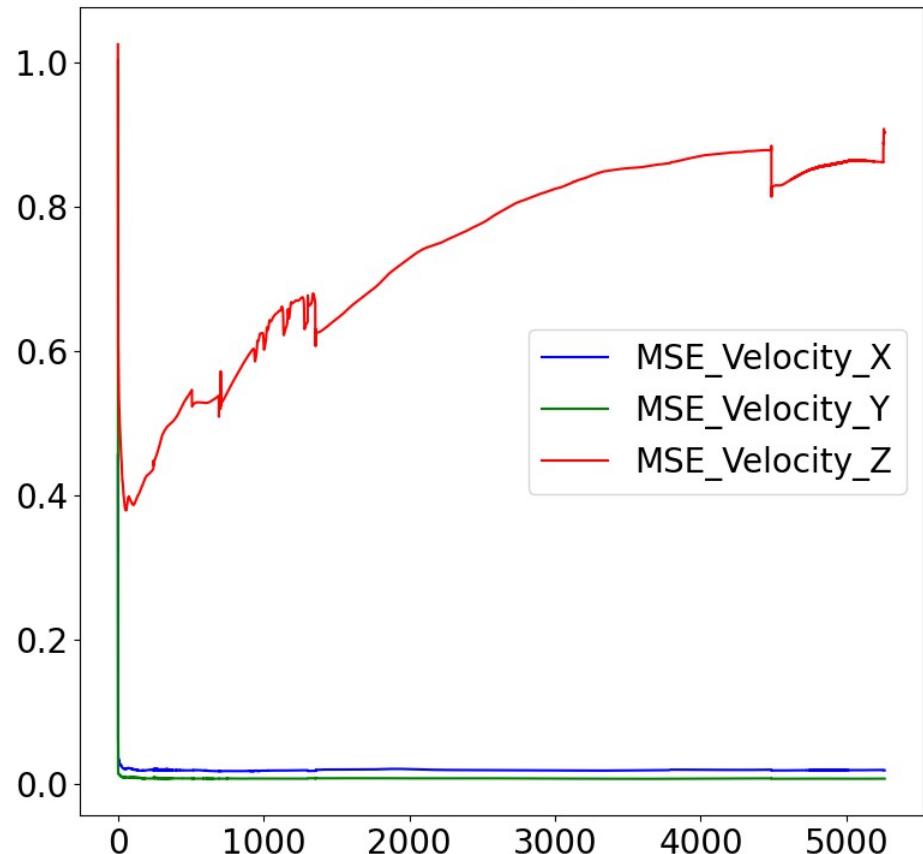
### MSE Loss



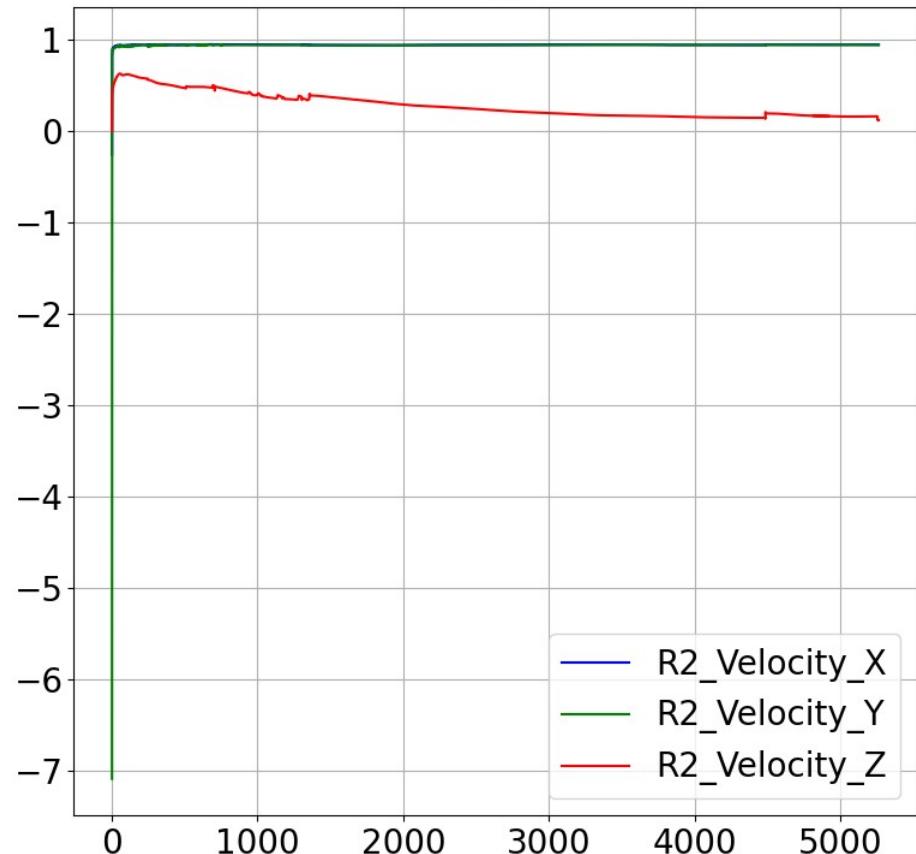
### R2



### MSE Loss



### R2



Progress so far - Data Loss Only  
Standard Normal Scalar – ELU Activation  
(Adam Optimizer)

Threshold = SMA 1E-5 (5262 Epochs, not completed), GPU Laptop

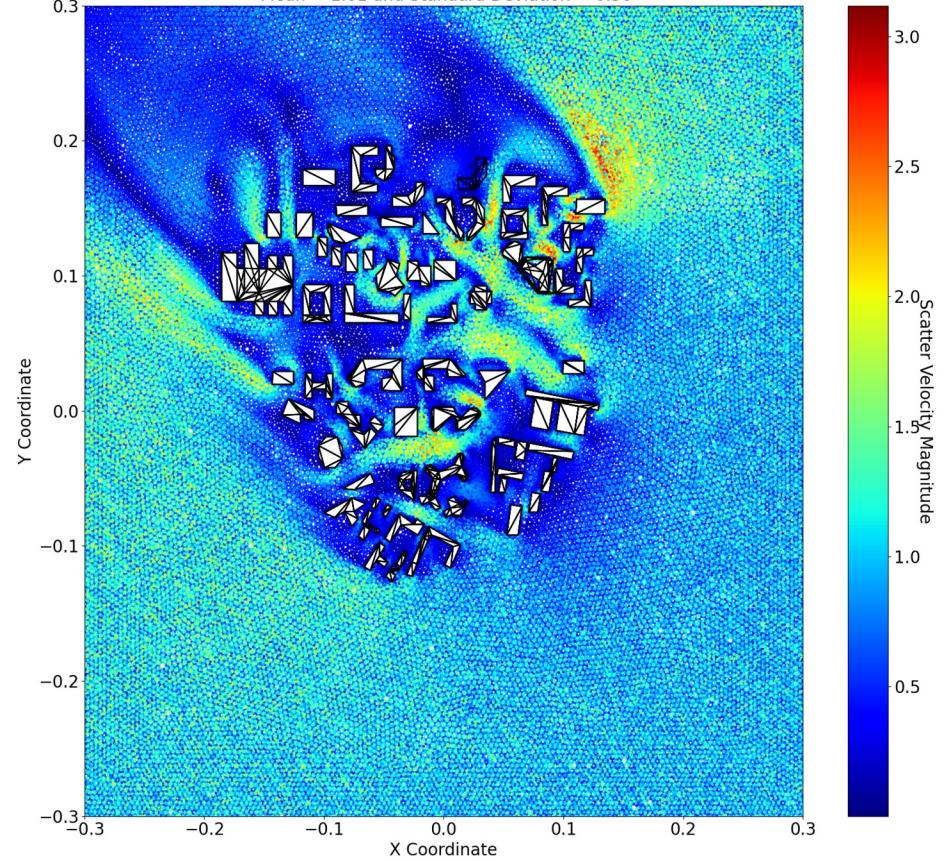
Scripts v5 – PREDICTING (Angle = 135)

Progress so far - Data Loss Only, Standard Normal Scalar, ELU Activation, Adam Optimizer  
Threshold = SMA 1E-5 (5262 Epochs, not completed), GPU Laptop  
Predicting Results – Metrics (Angle = 135)

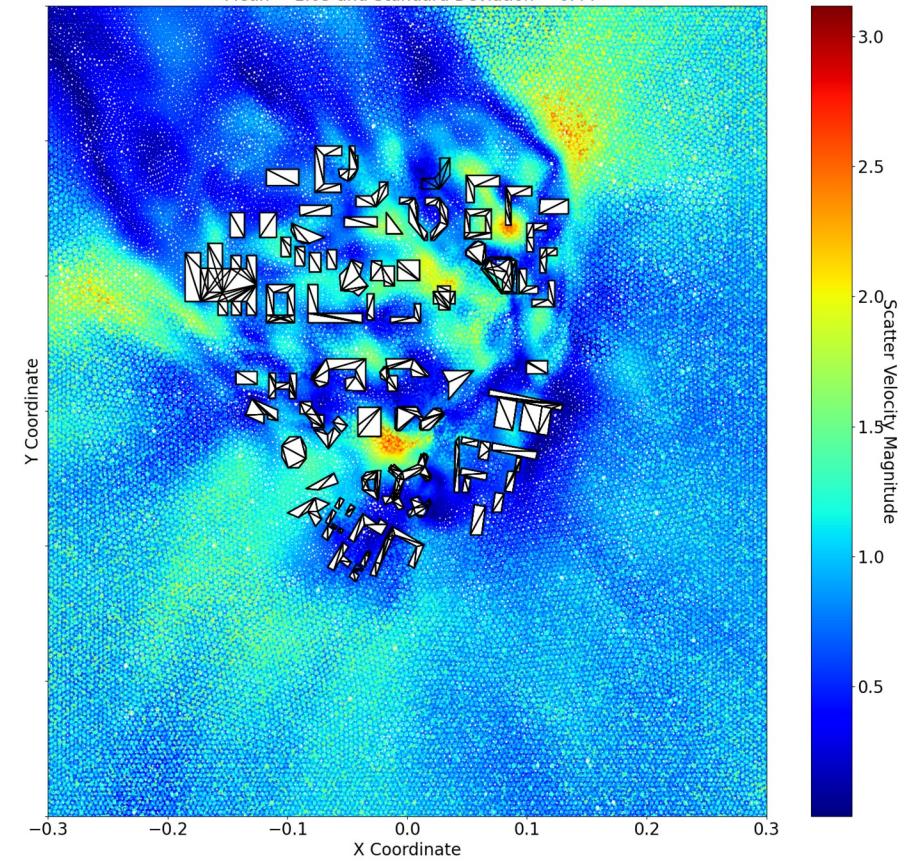
Variable	MSE	RMSE	MAE	R2
Velocity_X	0.054265383048	0.232949314334	0.125099061851	0.949717051299
Velocity_Y	0.062154605953	0.249308254885	0.138571628641	0.945479712073
Velocity_Z	0.016706039782	0.129251846340	0.042726262554	0.123535248722

Comparison of Actual vs. Predicted values with Wind Angle = 135 in the X-Y Plane with a cut at Z = 0.01 +/- 0.01

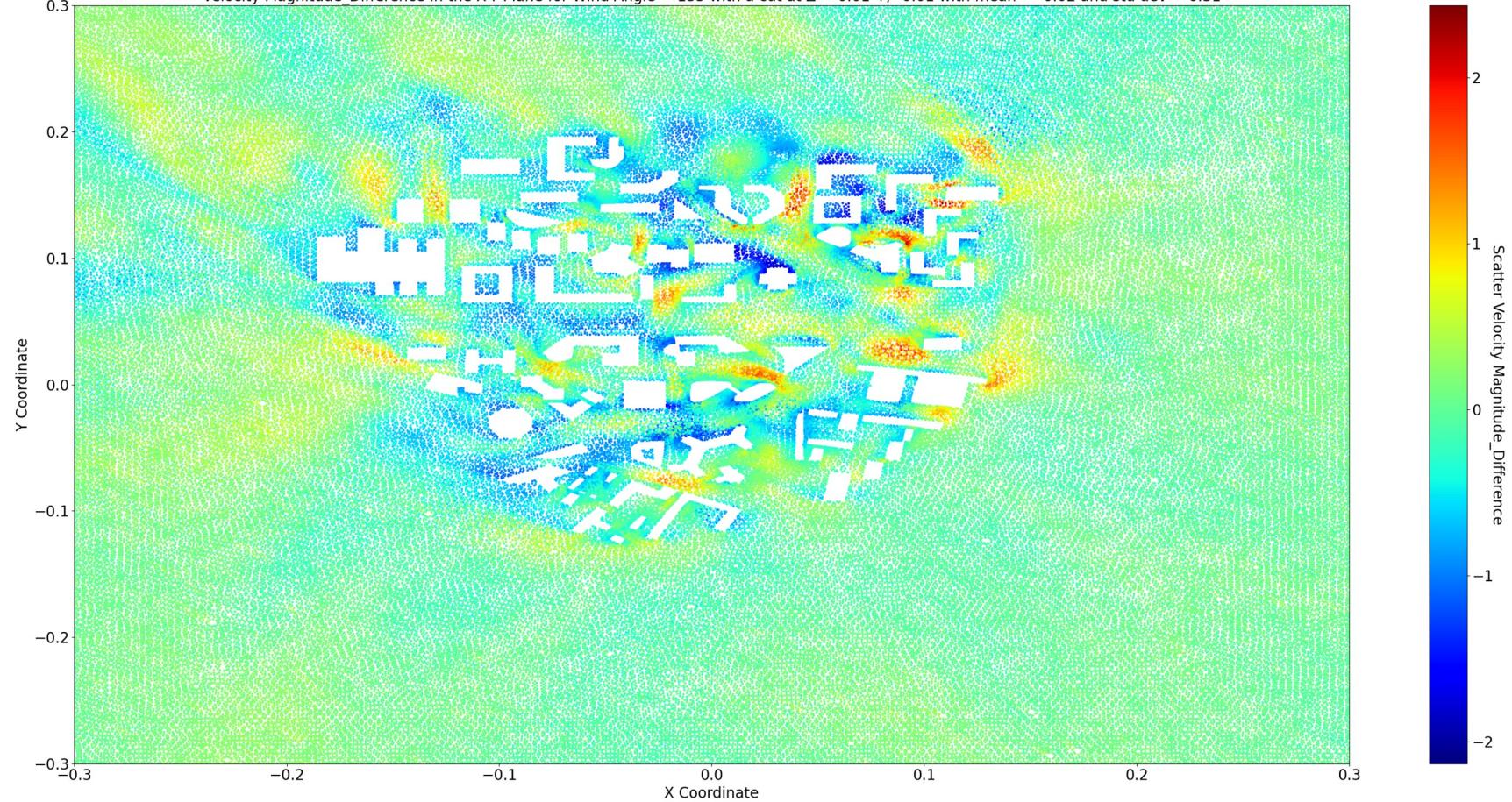
Actual Velocity Magnitude in the X-Y Plane for Wind Angle = 135 with a cut at Z = 0.01 +/- 0.01  
Mean = 1.01 and Standard Deviation = 0.50



Predicted Velocity Magnitude in the X-Y Plane for Wind Angle = 135 with a cut at Z = 0.01 +/- 0.01  
Mean = 1.03 and Standard Deviation = 0.44

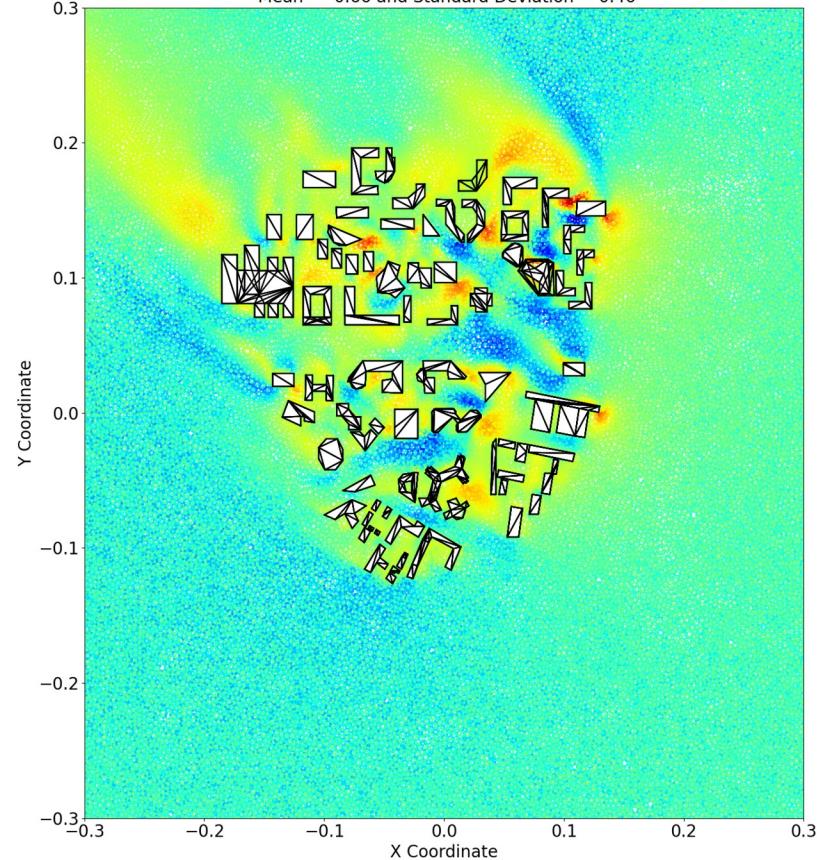


Velocity Magnitude\_Difference in the X-Y Plane for Wind Angle = 135 with a cut at Z = 0.01 +/- 0.01 with mean = -0.02 and std dev = 0.31

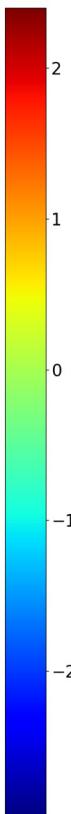
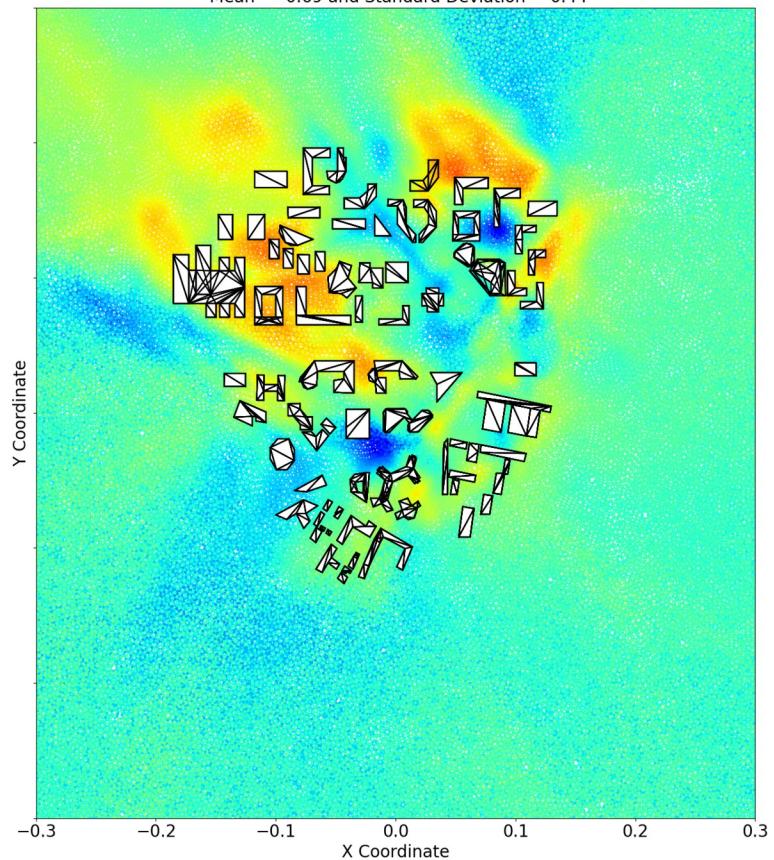


Comparison of Actual vs. Predicted values with Wind Angle = 135 in the X-Y Plane with a cut at Z = 0.01 +/- 0.01

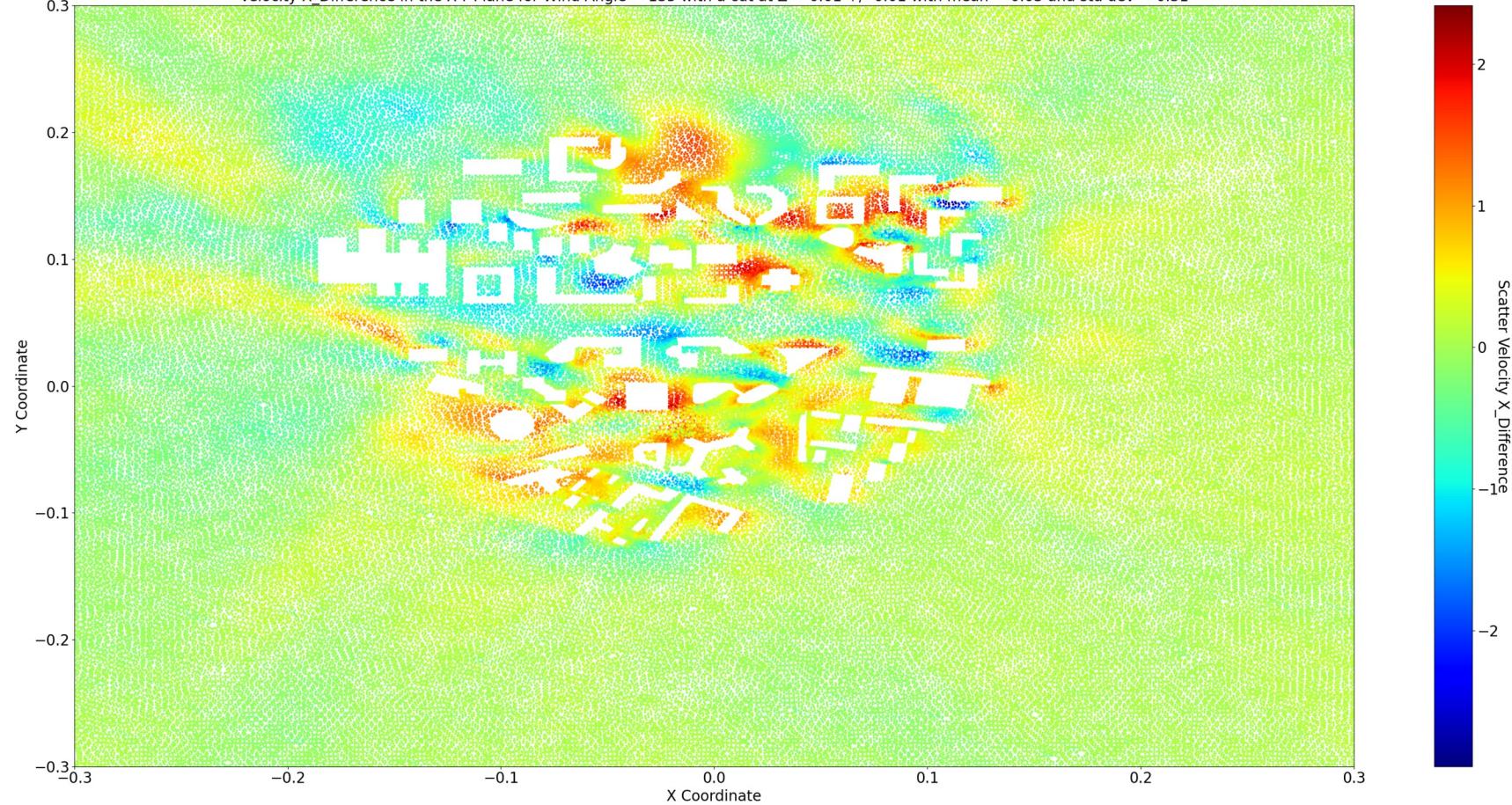
Actual Velocity X in the X-Y Plane for Wind Angle = 135 with a cut at Z = 0.01 +/- 0.01  
Mean = -0.66 and Standard Deviation = 0.46



Predicted Velocity X in the X-Y Plane for Wind Angle = 135 with a cut at Z = 0.01 +/- 0.01  
Mean = -0.69 and Standard Deviation = 0.44

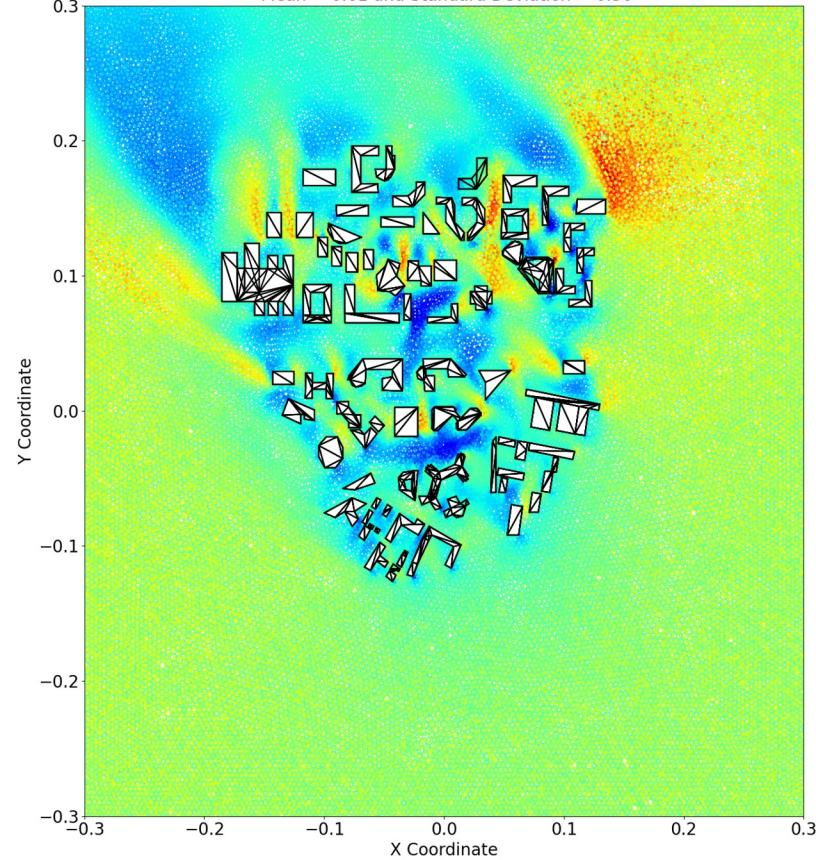


Velocity X\_Difference in the X-Y Plane for Wind Angle = 135 with a cut at Z = 0.01 +/- 0.01 with mean = 0.03 and std dev = 0.31

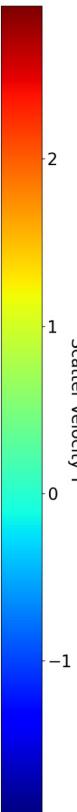
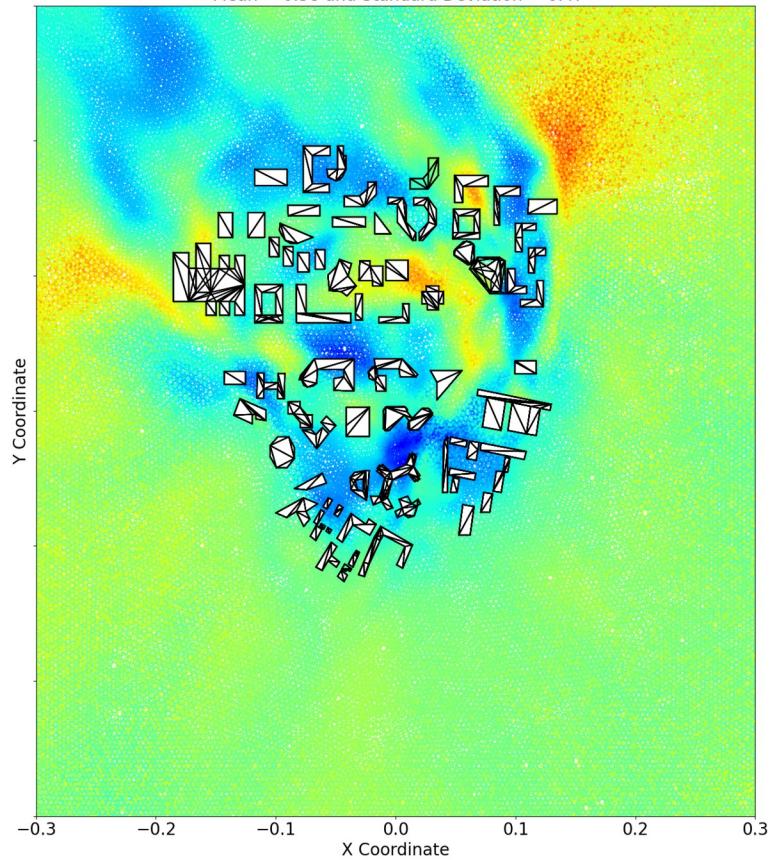


Comparison of Actual vs. Predicted values with Wind Angle = 135 in the X-Y Plane with a cut at Z = 0.01 +/- 0.01

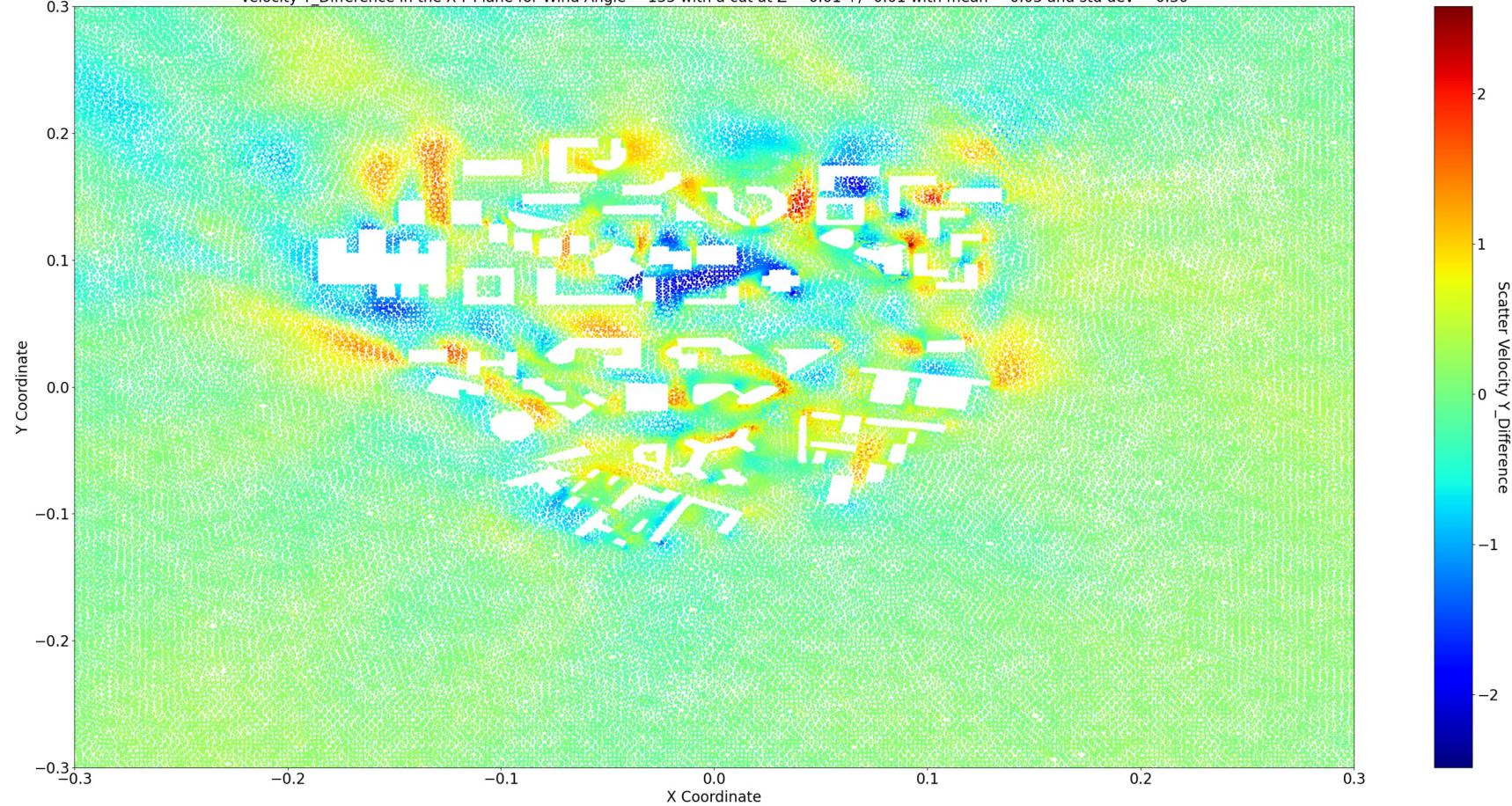
Actual Velocity Y in the X-Y Plane for Wind Angle = 135 with a cut at Z = 0.01 +/- 0.01  
Mean = 0.61 and Standard Deviation = 0.50



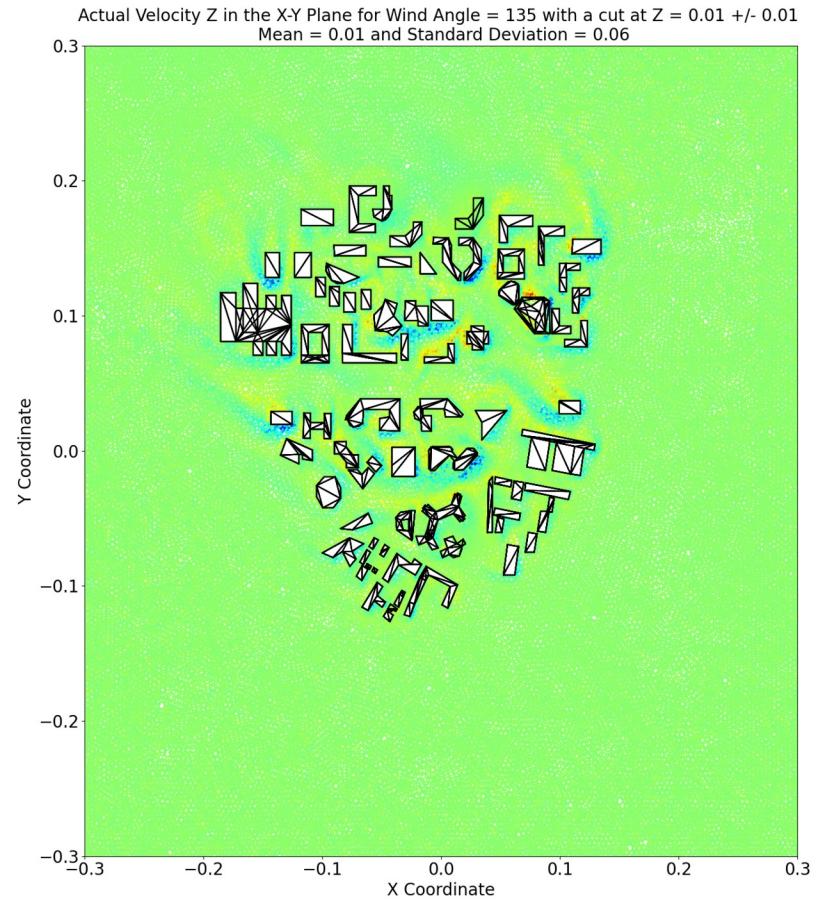
Predicted Velocity Y in the X-Y Plane for Wind Angle = 135 with a cut at Z = 0.01 +/- 0.01  
Mean = 0.58 and Standard Deviation = 0.47



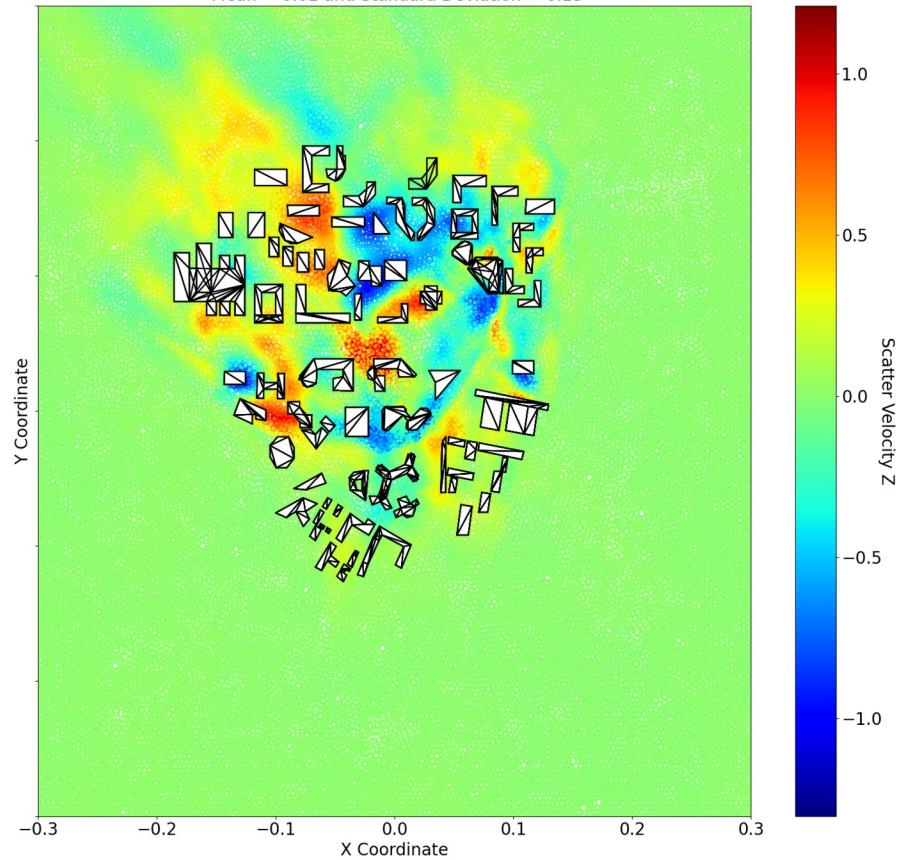
Velocity Y\_Difference in the X-Y Plane for Wind Angle = 135 with a cut at Z = 0.01 +/- 0.01 with mean = 0.03 and std dev = 0.30



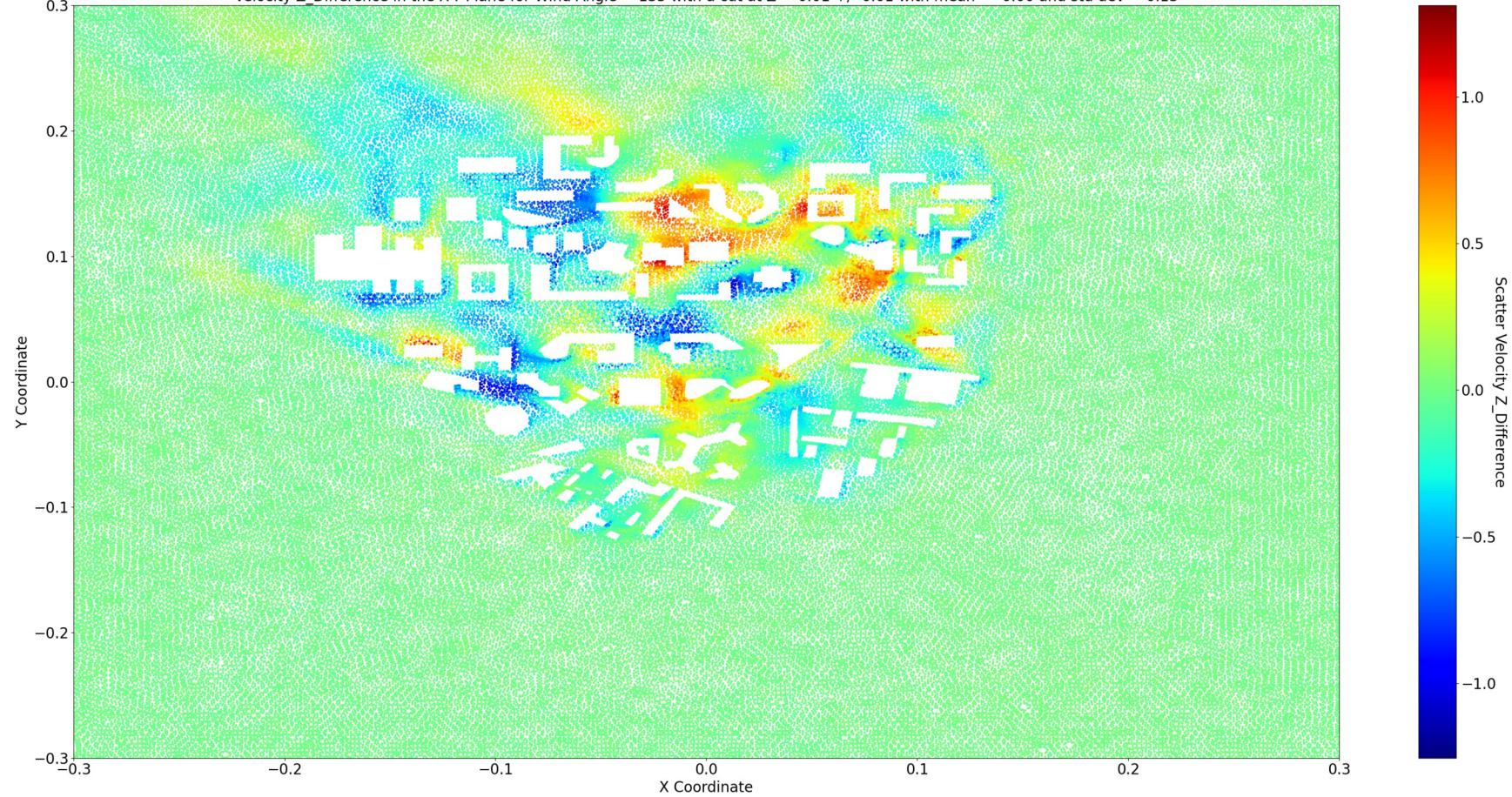
Comparison of Actual vs. Predicted values with Wind Angle = 135 in the X-Y Plane with a cut at Z = 0.01 +/- 0.01



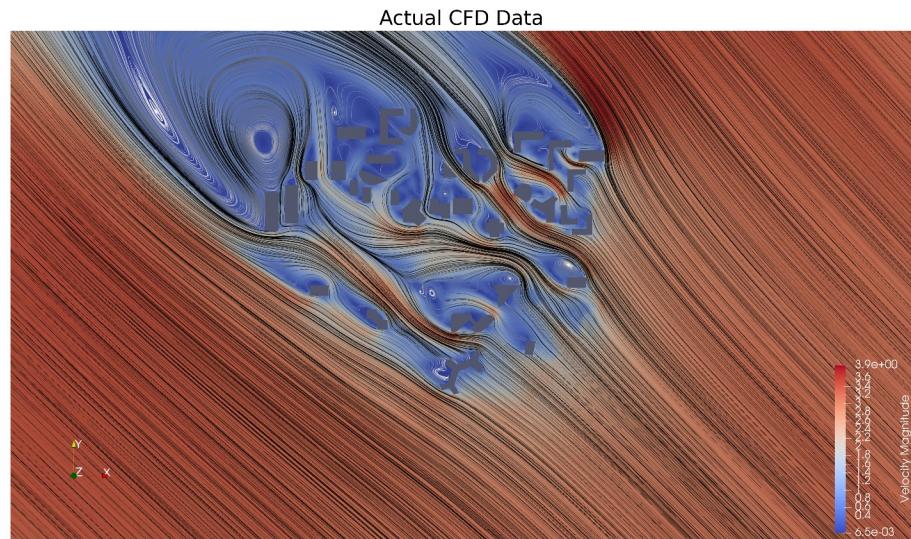
Predicted Velocity Z in the X-Y Plane for Wind Angle = 135 with a cut at Z = 0.01 +/- 0.01  
Mean = 0.01 and Standard Deviation = 0.13



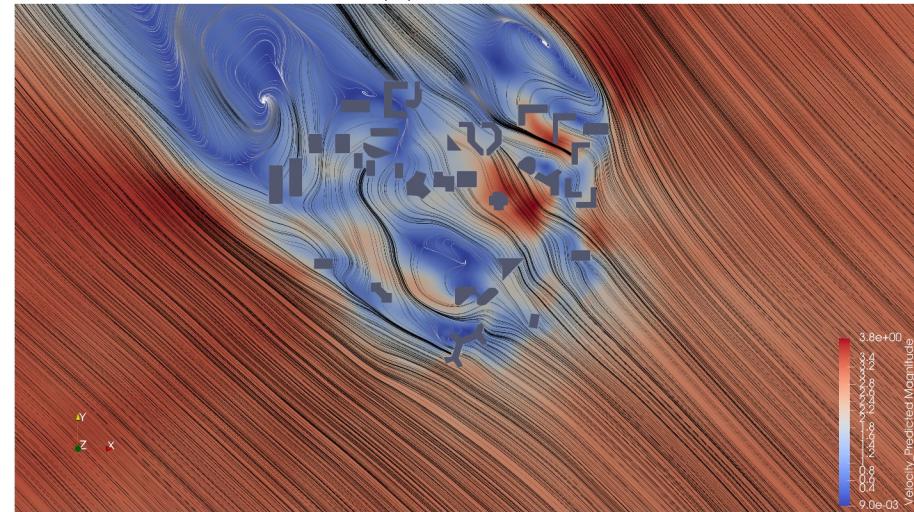
Velocity Z\_Difference in the X-Y Plane for Wind Angle = 135 with a cut at Z = 0.01 +/- 0.01 with mean = -0.00 and std dev = 0.13



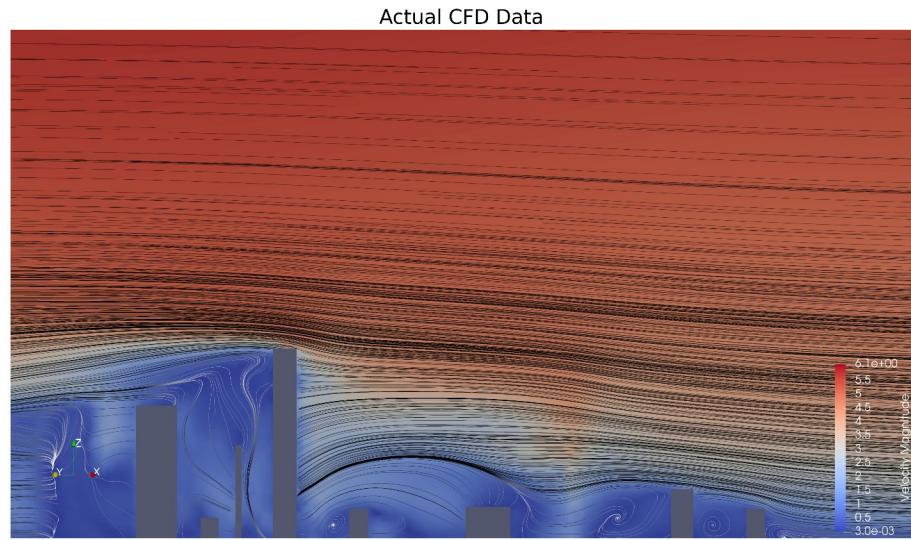
Actual CFD Data vs (PI)NN Prediction for Wind Angle = 135



(PI)NN Prediction



Actual CFD Data vs (PI)NN Prediction for Wind Angle = 135



(PI)NN Prediction

